

looking ahead

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Air Pollution—A Threat To Our Air Resources

Frank M. Stead

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DURING THE LAST ten years, the people of the United States, and to a lesser degree the peoples of the world, have become acutely aware of the fact that our air resources are not unlimited and that they may become seriously impaired by the activities which characterize our current ways of living.

The concern of people with air pollution stems from a range or spectrum of adverse effects which polluted air has on human beings. At the lower end of the scale is destruction of comfort and the enjoyment of living. As the degree of air pollution increases, the adverse effects pass successively through the range of interference with performance of normal tasks, production of chronic illness, and production of acute illness, to the occurrence of premature death.

The latter two effects, dramatized by the occurrence of 4,000 premature deaths and many times this number of acute illnesses in London in December 1952, have received the most publicity. It is very likely, however, that the destruction of comfort and the joy of living for large segments of the population may be by far the most significant aspect of contaminated air. The resultant impact of all these effects may well mean that the air resource is the limiting factor in urban population concentration, and air pollution may bring about a drastic change in our living patterns.

It is a matter of great importance that the population understand the basic elements of air pollution, have some concept of the causes and a sufficient grasp of the nature of the phenomenon to think constructively about remedial measures, both of an administrative and engineering nature.

AIR POLLUTION is a three-stage problem and the stages may occur successively or simultaneously. The first stage is that of individual point-source problems. For example, smoke, dust, or gas is dis-

The Business Institution

● "The business institution has become the great alternative to socialism and communism for the organization of society and the alleviation of some of the ills recited by Marx and a long line of socialists. Through the development of the business institution, the withering and stultifying influence of authoritarian government has been restrained on the North American continent and in much indeed of the western world, permitting the flowering of initiative and resourcefulness of free men leading to the remarkable increase in the standards of living.

● "The business institution is the key fact in the power of the United States in the world today."

*From an address by Donald B. Woodward,
Chairman of the Finance Committee, Vick
Chemical Company, at the University of
Wisconsin, on May 4, 1956.*



charged from a single stack and adversely affects an adjacent area. This type of air pollution is characterized by the following features:

- The contaminant moves by simple linear displacement with limited dilution with clean air.
- There is no change in chemical composition or physical state of the contaminant.
- The zone of influence is restricted to a small downwind area.

An extremely significant feature of this type of air pollution from an administrative point of view is that there is a small, compact group of "victims" and a single, easily identifiable "offender." Relief may therefore be sought under general principles of law. Furthermore, remedy may be achieved either by controlling the discharge, using available techniques and equipment, or by suitable location of the activity producing the discharge, so as to be downwind from residential areas. Consequently, this is the simplest form of air pollution with which to cope and the easiest to prevent by adequate preplanning.

THE SECOND STAGE of air pollution to occur as an area develops is pollution of the entire air mass in a metropolitan area. This type of air pollution is based on the concept that the total "loading" of air contaminants discharged to the atmosphere is too great to be adequately diluted by the available air supply. It is a concept of too many tons of contaminant per cubic mile of air. This type of air pollution has one characteristic in common with the first stage, i.e., there is no change in the chemical composition or physical state of the contaminants after they reach the air. This stage of air pollution does, however, introduce the following entirely new considerations, both scientific and administrative:

- A knowledge of the available air supply on a given day requires knowledge of the topography of the air basin, the effective "ceiling height" as determined by the temperature structure of the air in the basin, and the ventilation rate as governed by horizontal wind motion.
- Many types of contaminants are simultaneously present.
- It is not possible to relate an adverse effect on a small group of people to a single offender.

Coping with this type of air pollution requires a knowledge of the overall inventory of substances discharged daily to the atmosphere and

a knowledge of the daily meteorological characteristics of the area.

Measurement of the intensity of air pollution of this type is achieved by systematic, continuous monitoring with automatic instruments at a network of stations throughout the area.

Administrative control is best achieved through regulations applied to each general type of activity producing contaminants, such as combustion of fuel in furnaces or boilers, supplemented by a broad program of education.

This is the type of air pollution which for many years plagued the cities of Pittsburgh and Detroit and which recently has been successfully controlled in those areas. This problem to a greater or lesser degree faces every metropolitan area in the United States and has for years been a matter of concern to the industrialized cities of Europe.

THE THIRD STAGE of air pollution, and the one which is only now beginning to be understood, is that which, for lack of a better name, has come to be called "smog." First recognized in Los Angeles, California, at the beginning of World War II, it has now not only spread to the other metropolitan areas of that state but has been recognized in other parts of the United States, as well as in Japan, England, and the Philippine Islands. The putting together of the jigsaw pieces of the smog picture has been a most amazing chapter in scientific history and constitutes a true detective story stranger than fiction. In reaching even the present imperfect understanding of this phenomenon it has been necessary to abandon some of our most cherished "common sense" assumptions. After ten years of almost frantic research at a cost of well over ten million dollars, the following characteristics of smog can be listed with reasonable assurance:

- Smog results from reactions taking place in the atmosphere itself between raw materials or precursors (harmless in themselves at the concentrations found), catalysts, and atmospheric oxygen which form new compounds not originally present.
- These reactions take place between gaseous compounds at extraordinarily low concentrations (less than one part of precursor or catalyst to one million parts of air).
- Energy in the form of sunlight is necessary for these reactions to proceed and on removal of sunlight the reaction is partially reversible.

- The precursors of these reactions are hydrocarbons; the principal catalyst is nitrogen dioxide (NO_2); and the reaction products are oxidized hydrocarbons and ozone (usually referred to as a group as oxidants).

- The oxidants formed are capable, even at extremely low atmospheric concentrations, of causing irritation to the eyes and mucous membranes of humans and damaging or destroying certain types of growing plants. The aerosols (tiny particles of liquid or solid substance) associated with smog formation are capable of scattering light and destroying visibility.

The role of aerosols in the smog problem, aside from visibility interference, has not been clarified. There is reason to suspect, however, that aerosols may furnish the needed surfaces on which the atmospheric reactions take place and may also serve to absorb the irritating gaseous reaction products so as to intensify their effects on humans.

If this hypothesis concerning aerosols is accepted, it may be seen that smog results from the simultaneous existence in air of four factors, e.g.:

Hydrocarbons + NO_2 + Sunlight + Aerosols > Smog

It follows that complete elimination of any one of these necessary factors would eliminate smog. Such complete elimination, however, seems impossible; hydrocarbons are the basis of our liquid and gaseous fuels; nitrogen dioxide is produced in every combustion of fuel as well as by natural reactions in the upper air; elimination of sunlight is unthinkable even were it possible; and production of aerosols is so inextricably linked with human activity and natural phenomena that the earth's atmosphere may be thought of as already contaminated on a worldwide basis. Increasing the natural ventilation of a metropolitan area by artificial measures does not appear feasible in the near future, nor does it seem practical to envisage moving a major city out of its existing location in a topographic basin.

This, then, is the smog dilemma. The solution seems to lie in modification of the activities of man to reduce the escape to the atmosphere of hydrocarbons, oxides of nitrogen, and aerosols to the lowest achievable level and then to avoid a *concentration of such activities* as will overload the air supply of any area. It should be noted that it is an oversimplification to refer to hydrocarbons as a group as though all hydro-

carbons are equally effective as the precursors of smog. Research has indicated that unsaturated hydrocarbons of relatively low molecular weight are the ones most easily converted to irritating oxidants.

THESE CONSIDERATIONS lead inevitably to the conclusion that the air supply may limit the concentration of population and industry unless substitutes are achieved for present fuels which will eliminate the loss or discharge of hydrocarbons and oxides of nitrogen from homes, vehicles, and industry.

The problem has become critical first on the West Coast of the United States where large cities dependent on gaseous and liquid fuels have been located in topographic basins within an area where temperature inversions occur throughout the year and at latitudes within the solar belt. The problem will not remain confined to this area, however, but may be expected to become critical any place in the world where the necessary factors are present.

National Income Visualized

RECENT DECADES have seen the growth and spread of many efforts to "humanize" knowledge. Dr. Arthur O. Dahlberg of Columbia University pioneers a new method for visualizing economics in *National Income Visualized*. The technique used in this book to visualize, integrate, and transmit the subject matter tells an economic story in both words and pictures.

Historically, businessmen and economists have had only three means for communicating and describing the structures and processes with which they dealt: words, line charts, and statistical tables. This book illustrates how they can now also use a fourth method—a system of integrated symbols. For example, businessmen using this technique can now portray by means of perspective diagrams the structure of their own corporations and the interlacing of their own company operations. Economists can utilize this method to draw pictures of the structure and operation of those portions of the economy in which they specialize. *National Income Visualized* provides a new systematic symbolism which

may serve the descriptive role in economics that mechanical drawing performs in engineering. ("National Income Visualized," by Arthur O. Dahlberg. From: Columbia University Press, New York, 1956. 138 pp. \$3.50)

NOTE: NPA members are reminded that the above book and all other current American books in the social sciences and related fields are available to members of the Association on a rental basis through the Social Sciences Library Service.

Cornell Conference

A MANAGEMENT SEMINAR on Human Problems of U. S. enterprise in Latin America will be held from June 24-28 at Cornell University. Sponsored by the New York State School of Industrial and Labor Relations, the conference is designed to aid American management in developing its business activities in a manner that will lead both to economic success and to harmonious relations with Latin Americans.

Governments of the States

TWO MORE VOLUMES in the American Commonwealth series on the state governments and administration of Iowa and New Jersey have been released. Each book devotes a section to particular state issues. Thus, the New Jersey study, by Rutgers professor Bennett M. Rich, presents a discussion of the unique 1947 state constitution and the resulting governmental reorganization. Iowa State University associate professor Russell M. Ross, in the Iowa study, analyzes the 100-year reluctance of Iowa to make any move to improve its legislative services.

Both books contain full-scale, up-to-date descriptions of the states' governments—the workings of their various laws, programs, departments, and agencies—written by especially qualified men of these states. The series is directed to both government officials and citizens, students and professional people, public and private organizations, showing them how the governments work.

("The Government and Administration of New Jersey" by Bennett M. Rich, and "The Government and Administration of Iowa," by Russell M. Ross. From: Thomas Y. Crowell Co., 432 Fourth Ave., N. Y. 16. 1957; N. J., \$7.50; Iowa, \$7.00)

—the People of NPA—

James

G.

Patton



James G. Patton, NPA trustee and member of the Agriculture Committee, in the early '30's as a young farmer, organized cooperative insurance for the Colorado Farmers Union of which he was then executive secretary. He became a nationally prominent agricultural spokesman in 1937, when he was elected to the National Board of Directors of the Farmers Union. In 1938, he became president of the Colorado Farmers Union. Since 1940, he has been president of the National Farmers Union, its life and auto insurance companies, and service corporation—promoting stabilized agriculture and equal opportunity for rural families. During the war, Mr. Patton represented agriculture in positions of national importance: as representative of the Carnegie Endowment for International Peace; U. S. delegate to the American Conference of Associations of Commerce and Production (1941), and the 2nd Inter-American Conference on Agriculture (1943); as member of the National Committee for Civil Defense (1942), and the Economic Stabilization Board, National Labor Management Policy Committee (1942-43), and the Advisory Board of War Mobilization and Reconversion Administration (1943-47). After the war, he was an adviser at government conferences: the Inter-American Conference on War and Peace; the UN Conference on International Order (1945); the FAO conventions in Quebec, Copenhagen, Geneva, and Washington (1945-48). As a founder of the International Federation of Agricultural Producers, he represented the Farmers Union at I.F.A.P. meetings in London, the Hague, and Paris, becoming an executive committee member in 1950. Mr. Patton has emphasized the inter-dependence of agriculture and industry in a vigorous economy; in 1946, he successfully sponsored the Full Employment Act.

The Future of the European Market

Milton Gilbert

Director of Economics and Statistics,
Organization for European Economic Cooperation, Paris

THE 8TH REPORT of the OEEC, published at the end of April 1957, bears the title, *Europe Today and in 1960*. The report deals not only with the customary analysis of the current economic situation and developments over the past year, but also indicates expansion prospects of the European market for the next five years.

Twice before, in 1948 and 1952, the OEEC issued reports charting future prospects. The aim in each case was not simply to forecast, but to set objectives and targets for Western Europe's reconstruction and recovery. In the present report, however, the projections are not fixed goals for government policy but rather represent an appraisal of probable developments in a period expected to be guided predominantly by free market forces. The report estimates the likely increase in overall production, studies how the demand pattern will affect the composition of output, relates these forces to probable developments in investment and in major industries, and appraises the probable impact on foreign trade and the balance of payments. The statistical estimates for 1960 are not intended as hard and fast forecasts; it is hoped they provide approximate quantitative guides that will be helpful in the formulation of government and business policies.

1956 was a transitional year in the trend of European economic expansion. The previous five-year period saw an exceptionally rapid increase in total output; the real gross national product of the OEEC countries combined rose by 27 percent from 1950 to 1955. This high rate was made possible partly because the normal productivity increase was augmented by an element of industrial recovery and by exceptional gains made in the newer, more productive industries. But even more, it was accomplished by the unusual increase in total employment resulting from reduced unemployment, absorption of immigrants from Eastern Europe and North Africa, increased hours of work through full employment and overtime, and a large flow of women into the labor force.

By the end of 1955, full employment conditions prevailed in almost all countries and it was evident that the exceptional factors of previous years would have much less force in the

five-year period to 1960. It is expected that the maintenance of a high level of investment will result in good productivity gains but that the smaller potential increase in employment will limit the rise in GNP to something between 17 and 18 percent. Of course, there is nothing basically adverse in this expected change to a lower rate of expansion; it is certainly not a misfortune that employment is already high and that the return to normalcy has now been accomplished. Nonetheless, the change in trend does raise basic problems for economic and financial policy, if strains are not to develop in the relation of demand and potential supply. It highlights, too, the importance of productivity in future progress and the key role that the creation of a free trade area in Europe will play in assuring competitive impetus to increasing efficiency.

TO PROJECT the demand pattern for the years ahead it is necessary to assume that a deterioration of the international political situation will not require a drastic change in military requirements. The report assumes that defense expenditures will remain relatively stable, except for the rearmament programs scheduled in Germany and Austria.

Given that assumption, it is clear that the dynamics of the European economy will be dominated by the fact that the European consumer is now really entering the durable goods age. The buildup of durable goods production was begun in the past five years, but rearmament needs, the exceptionally large increase in housing construction, and the de-rationing of foods have limited the resources that could be devoted to it.

In the present five-year period the increase in food purchasing will be less and residential construction is expected to be rather stable in most countries, except France and Italy. Consequently, the relative importance of durable goods will be much greater and will have important repercussions on basic industries. For example, the number of registered motor vehicles is expected to rise from 16.5 million in 1955 to 25.5 million in 1960; steel production was 77 million tons in 1955 and it is estimated it will be 102 million in

1960; oil refining and petroleum imports are expected to increase by about 50 percent.

The ramifications of these prospects cannot be detailed here, but certain implications for the pattern of investment are obvious. Investment in steel, oil refining and tankers will increase substantially. The pressure for new roads will be enormous, particularly since road construction has been delayed in the past because of more urgent requirements. In addition, air transport capacity is expected to double in the five years ahead and investment in atomic energy to create a significant demand for capital resources.

In the social field, a very substantial increase in school construction may be anticipated, particularly in secondary and higher education. This is not only because of population factors, but also because modern industry requires an increased number of skilled technicians and a broader base of well-trained workers.

In discussing Europe, one must always ask what are the prospects for the balance of payments since trade is the key to the economic situation in a way that it is not in the United States. The study indicates that expansion will not require a disproportionate increase in imports—that is, one that cannot be met by a reasonable development of export markets. Nonetheless, some continuance of balance of payments pressures can be anticipated because of declining U. S. military expenditures in Europe and because the present situation is not one of comfortable equilibrium. It is true that the main danger to the balance of payments would be demand inflation. Continued growth of world trade, reinforced by liberal trading policies, however, is necessary for the healthy development of our European allies.

Main Street, 1969

MAIN STREET, 1969, will be the theme of the 1957 National Citizens Planning Conference to be held in Little Rock, Arkansas, on June 9-12. 1969 is the date the 13-year Federal highway program will end. The conference program will explore the impact of new shopping center concepts, the interregional highway system, the tourist industry, and regional river-valley development on the main streets of America.

Speakers at the conference will be Victor Gruen of Victor Gruen & Associates and William Zeckendorf, president of Webb & Knapp Corp., realtors and developers. Mr. Gruen will explore

the impact of new shopping center concepts, and Mr. Zeckendorf will deal with the part the businessman must play in the development of Main Street 1969.

(Metropolitan Area Planning Commission, 209 1/2 West 2nd Street, Little Rock, Arkansas)

Foreign Trade and U. S. Prosperity

VITAL AS FOREIGN TRADE now is to the United States, the world's greatest trading nation, it will constantly grow in importance as this country becomes more and more dependent on the outside world, according to a recent report issued by the U. S. Council of the International Chamber of Commerce.

Some highlights of the report are that:

- U. S. exports of goods and services are larger in value than all consumer purchases of autos and auto parts, and they are worth more than all non-farm housing construction.
- Nearly every branch of American industry producing movable goods exports some of its products. The major export industries greatly influence the pace of business activity in the whole economy.
- Since World War II agricultural exports have produced roughly one-eighth of total farm cash income.
- Foreign trade benefits all workers indirectly, and provides more direct employment (producing exports and handling or processing imports) than the textile, auto, chemical, and steel industries combined.
- Essential exports cannot be maintained without increased imports except by continuing foreign aid at the expense of the American taxpayer.
- Imports provide a vital supplement to our domestic resources which are steadily becoming less adequate to meet our needs as domestic resources are depleted while population and living standards increase.
- The number of Americans who might be injured by expanding foreign trade is very small compared with those who will benefit.

The report describes foreign trade as important to our national security because of its contribution to the "vigor and flexibility" of our economy, its effect of conserving irreplaceable raw materials, and its importance to the economic strength of our allies.

("The Importance of Foreign Trade to the United States Economy." From: U.S. Council, International Chamber of Commerce, 103 Park Avenue, New York 17, N.Y. 30¢)

A New Approach to Foreign Economic Assistance

NEARLY ALL foreign economic aid should take the form of repayable loans, and a government cooperation should be established to administer economic phases of the U.S. foreign program, an NPA International Committee statement of April 17th urges.

The Committee, in its policy statement "A New Approach to Foreign Economic Assistance," recommends that the proposed government corporation take over functions and personnel of the International Cooperation Administration. It could be autonomous in its operations, but under general policy guidance of the Secretary of State.

The corporation, the Committee says, should have much greater flexibility in lending policies and operations than the Export-Import Bank.

The statement analyzes the purposes and nature of foreign aid and concludes that the main requirements for an effective program would be met better by lending through the proposed corporation than by continuing the present setup. These requirements are:

1. *Long-term continuity*—Previously, continuation of foreign aid has required annual renewal of authorization and appropriation. The Committee notes that legislation establishing the the corporation should not require annual renewal, but that this would not prevent yearly review of corporation activities by Congress.

2. *An aid program of adequate size*—Original capital of the proposed corporation should be at least \$1 billion, probably provided by appropriation. When most of this sum has been used, additional capital could be obtained through another appropriation or a public debt transaction, depending on future conditions.

3. *Repayable aid*—The new corporation should be able to make nonrepayable grants, but only on a limited scale for emergencies and other special purposes. Most economic aid should be provided as loans repayable on terms suited to each country. This, the statement contends, would relieve these nations of an indefinite moral obligation which might breed resentment and nullify good effects of the aid program.

4. *Separation from military aid*—Although military and economic aid are separately administered, some underdeveloped countries

have been "suspicious of . . . economic aid or technical assistance programs because they are linked with mutual defense alliances and military aid programs in the same appropriation of funds."

5. *Private participation in aid*—Private investment should be encouraged and government-to-government assistance should work as a complement to it. Subcontracting parts of the economic aid and technical assistance programs both to business corporations and to universities and other nonprofit organizations, already in practice, should be extended wherever practicable.

6. *Improved personnel conditions*—Higher salaries, protection of career status at home, periodic rotation of overseas personnel to home service, and other measures are recommended to raise the caliber of people administering aid programs and to ease the problem of recruitment.

The statement recommends that defense support aid, which includes funds both for maintenance of troops and military productions in countries under pressure from communism and for general economic assistance to these nations, should be divided with the military portion going to the Department of Defense and the economic portion to the proposed new corporation. ("A New Approach to Foreign Economic Assistance," a statement by the NPA International Committee, April 17, 1957. From: NPA, Special Report No. 47, May 1957. 24 pp. 25¢)

The Grievance Process

THE GRIEVANCE PROCESS, part of our collective bargaining process, offers individuals and work groups in the United States the opportunity to take up particular labor-management problems, have some means of redress, and argue their problems—without fixed government regulation—with people close to the problems in the plant itself. (continued)

"The Grievance Process," published by Michigan State University, reports on the 1956 proceedings of the Industrial Relations Conference held for lawyers, arbitrators, and union and labor-management representatives. A panel discussion on the basic problems in grievance processing with an eye to making this procedure accomplish its purpose highlighted the conference.

Included in the panel discussion were such topics as good faith bargaining, interpreting the contract, "policing" the contract, union-management consultation before action, defining the grievance issue, the grievance procedure after the written grievance has been filed, procedural considerations, fact-gathering and disclosure by both parties, the number of steps necessary in grievance procedure, and grievance mediation in collective bargaining agreements.

Workshop reports were also presented expressing the views of conference participants on: the role of the foreman and shop steward; what is a grievance; the meaning of a large volume of grievances and arbitration; grievance mediation; joint foremen-steward meetings on contract interpretation; time limits in the grievance procedure; and employer notice to the union on production changes.

The report discusses the scope and role of the American Arbitration Association which was organized to promote arbitration in labor-management disputes. A demonstration arbitration involving the right of a company as a party to a collective bargaining agreement to subcontract work concludes the report.

("The Grievance Process." From: Labor & Industrial Relations Center, Michigan State University, 1956. 112 pp. \$1.00)

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